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# United States Department of Agriculture,

FOREST SERVICE.

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## TREE DISTRIBUTION UNDER THE KINKAID ACT, 1911.

(First revision.)

Annually since 1911 the agricultural appropriation act has contained a provision for the free distribution of young trees from the Bessey Nursery, Nebraska National Forest, Halsey, Nebr., as follows:

That from the nurseries on said forest the Secretary of Agriculture, under such rules and regulations as he may prescribe, may furnish young trees free, so far as they may be spared, to residents of the territory covered by "An act increasing the area of homesteads in a portion of Nebraska," approved April 28, 1904.

The act referred to is commonly known as the Kinkaid Act, and the portion of Nebraska included is shown on the map (fig. 6).

Under the foregoing provision, trees have been distributed as follows:

| Year. | Number of applicants. | Number of trees distributed. |
|---|---|---|
| 1912 | 494 | 44,460 |
| 1913 | 540 | 189,000 |
| 1914 | 712 | 248,500 |
| 1915 | 746 | 112,110 |

The reports sent in by those who received the trees indicate that there has been an average survival of from 35 per cent in the dry season of 1914 up to 70 per cent for the excessively wet season of 1915. These results, secured by inexperienced planters, indicate that trees can be grown successfully in the Kinkaid region despite the poor sandy soil, the severe winters, the moderate rainfall (records show a precipitation of about 22½ inches per annum at Halsey, decreasing to about 15 inches in the northwest corner of Nebraska), and the fact that few trees have ever grown naturally in this territory except along the river valleys and on Pine Ridge in the northwestern portion of the State.

Jack pines planted in 1903 by the Forest Service at Halsey have, at the end of 1915, made a height growth of from 15 to 20 feet. The accumulation of pine needles on the ground, and the shading out of the grass and the lower branches of the trees, indicate that forest conditions now prevail. Later plantations have had a survival of from 50 to 85 per cent on the roughest and lightest sand hills in the

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State. Nearly 3,000 acres have been successfully planted here by the Federal Government, and it is evident that tree raising is no longer an experiment in this territory, formerly considered so inhospitable to tree growth.

### OBJECTS OF TREE DISTRIBUTION AND PLANTING.

The main object of the tree distribution by the Government is to stimulate interest in tree growing chiefly for the production of fuel and fence posts and the establishment of windbreaks. Owing to the adverse soil and climatic conditions it is not to be expected that planting will result in the production of high-grade timber, but with proper care wood-lot plantations should begin to yield fence posts and firewood in 15 years. Since trees will do well on soils not suitable for farm crops, profitable use can be made of what might otherwise be unproductive areas. Furthermore, the establishment of windbreaks and wood lots makes living conditions pleasanter and adds materially to the value of the property.

No fruit trees are furnished from this nursery.

### THE SELECTION OF SITES FOR PLANTING.

The influence of the site, such as north slope, south slope, ridge top, and bottom, strongly affects the growth of various tree species; it is probable that the greatest success will come from planting on the north slopes. In these situations the soil is generally more moist and it is protected to some extent from the drying heat of the sun. Frost leaves the ground on the north slopes a little later in the spring, but by the time the season is far enough advanced for planting (generally Mar. 15 to 30) the soil in the north slopes will be in excellent condition for planting. Where the ground is level, or nearly so, the choice of site is, of course, not governed by topographical conditions; one place is as good as another.

### WHEN TO PLANT.

The period from April 1 to June 30 is marked by more than the average rainfall. Records show that 42 per cent of the total rainfall for the whole year comes in the three months, April, May, and June. It is very important, therefore, to begin planting immediately after the frost leaves the ground, so that the trees can get the full benefit of the spring rains.

### SPECIES TO PLANT.

There are several trees suitable for planting in this district, and a brief discussion of the characteristics of each is given to assist the planter in selecting those which will best suit his particular needs.

Those which are likely to give the best satisfaction are the coniferous, or so-called "evergreen," trees. Western yellow, or bull, pine,

Chinese arborvitæ, and jack pine will grow in this region. Some of the hardwoods (deciduous or broadleaf trees) which give satisfaction are cottonwood, American elm, honey locust, hackberry, and green ash.

The degree of success which will follow planting will depend largely on the care which is exercised in selecting the site on which the trees will be planted. Some trees will do better on the north slope, others on a ridge; most of the hardwood species will succeed best in the bottoms. The man who expects to get results must consider the requirements of the different species he is planting.

### JACK PINE.

Jack pine (*Pinus divaricata*) is hardy and rapid growing. It will grow on poor soil but requires plenty of light. The wood is light, moderately strong, coarse grained, and suitable for rough construction and for posts when treated with a preservative material.

The jack pine will grow well even on south slopes where there is little moisture and where many other trees have failed. While it is not the most desirable tree from the standpoint of utility, its ability to withstand dry climate and poor soil makes it valuable. This species makes a rapid growth and is in most demand by settlers.

### WESTERN YELLOW PINE.

Western yellow, or bull, pine (*Pinus ponderosa*) is one of the hardiest of the trees that can be grown in this region, and the quality of the wood, together with its freedom from disease, makes it very satisfactory. It will do well on ridges and north slopes or in the pockets, and responds to cultivation with increased growth. It thrives best in pure stands (that is, unmixed with other species) and grows rapidly enough to establish itself within a few years. It is probably the most valuable tree that can be grown in this part of the country and should give more uniform success than any other species. The growth for the first few years is slow, but after the fifth year it may grow from 12 to 18 inches annually.

### CHINESE ARBORVITÆ.

The Chinese arborvitæ (*Thuja orientalis*) is a thrifty evergreen which is native to those parts of China whose soil, moisture, and temperature conditions are similar to those of western Nebraska. It makes a rapid growth and those trees planted in the Halsey plantations show a high survival. It will grow on soils containing a considerable amount of alkali. The wood is durable and serviceable for fence posts and it is especially recommended for windbreaks and hedges.

### HARDWOODS.

Hardwoods should be planted in heavier and more moist soils than conifers, preferably in tilled bottoms, and they should be cultivated for several years after planting. Cottonwood makes a very good growth in this region, but it is short lived and subject to attacks of borers.

White elm, honey locust, and hackberry are well adapted to planting in this region because of their ability to grow on dry soils and to resist severe frosts without injury, but cultivation is necessary until the trees are well established. Russian olive adapts itself to arid soils. Green ash will grow on the moister situations, but its growth is slow and it is subject to attacks of insects.

Hardwoods require more moisture and better soil than pines, and also require cultivation to insure success. Since most of the land in the Kinkaid district is characterized by a sandy soil, which can not be safely cultivated because of blowing, it is obvious that pines are best suited to sandy sites and that hardwoods should be employed only where the better grades of soil are found or where some local conditions favor their growth. In addition, evergreens make a more satisfactory windbreak, as the foliage remains on the trees throughout the year. The timber produced is also of better grade than that of the ordinary hardwoods grown in the sand hills.

## SHIPMENT AND CARE OF TREES.

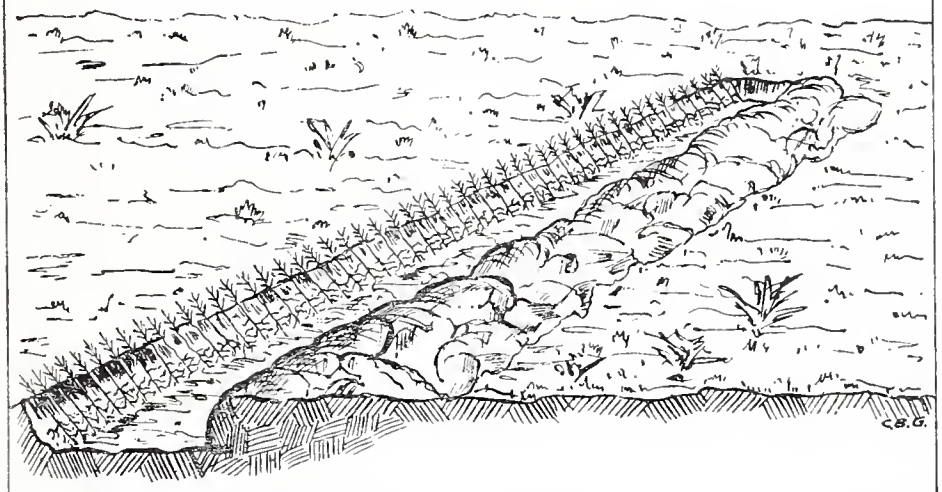
Trees may be shipped from the nursery by parcel post, provided stamps are sent to the forest supervisor at Halsey, Nebr., before March 1 of each year. Planters will be notified at least one month before this date of the amount of postage required. Unless mail shipment is requested the trees will be sent by express, charges collect.

The trees will be shipped in bundles that will allow free circulation of air for the tops. The roots will be packed in damp moss to prevent drying out. Young trees, especially pines, are very tender and susceptible to injury, and if the roots are exposed to the air, even for only a few minutes, they are likely to be injured, if not killed entirely. If special care is exercised in handling the stock, a more successful plantation will result. Trees should not be left around the depot or post office longer than is absolutely necessary. It is best to plant the trees immediately after receiving them. If this can not be done, store them in a cellar or some cool, moist place, or heel them in as shown in figure 1. The tops of evergreens in packages should not be wet, but if there is any danger of the roots becoming dry they should be moistened, but not soaked. This can be done by pouring a small quantity of water over the stems at the top of the package, allowing it to trickle down into the roots and moss.

# FIG. 1

## HEELING IN

This should always be done if the trees can not be planted immediately.



Dig Trench in moist earth deep enough to bury the roots and part of the stems allowing the roots to hang down full length, covering each layer of roots as placed.

Do not double or curl them. Each layer of roots should not be more than two inches deep and the thickness of the soil over the roots should always exceed the depth of the layer of the roots.

## METHOD OF PLANTING.

When ready to plant, take the trees out of the package or from the ground where they have been heeled in and place in a box or bucket, which contains some of the moss in which the trees were originally packed. The roots should be surrounded by wet moss and the trees themselves covered with a piece of burlap saturated with water. When planting, the trees should be drawn from the bucket or box one at a time and put into the ground with as little exposure as possible.

Care in planting trees is as important as care in handling them and if they are not given careful attention when they are set in the ground they can not be expected to live. Correct and incorrect methods of planting are shown in figure 2.

The best way to plant evergreens is to plow a furrow and place the trees in slits made with a spade, as shown by figures 3 and 4. These furrows can be plowed in sod and the trees will require no cultivation, unless the planter desires to stimulate their growth by cultivating. Cultivation should not be done in soil that will blow. Success in tree planting can not be expected if the trees are stuck in sod and left to care for themselves, as the grass will crowd them out. This grass competition is greatly reduced by plowing a furrow, this being the method used in the planting operations on the Nebraska forest.

Hardwoods, if small rooted, may be planted in furrows in the same manner as conifers, or, if the roots are large, by the deep-hole method, illustrated in figure 5, but always in prepared ground. The hole should be large and deep enough to accommodate all the roots without crowding. Hold the tree upright with roots in natural position, and cover the roots with loose, moist soil, tamping as shown. Watering at the time of planting is always advisable, especially in dry seasons and on sandy soils. Wind shields, such as shingles or narrow slats, set to protect the plant from the prevailing winds, are often necessary on exposed areas. Hardwoods should be cultivated for at least three years after planting.

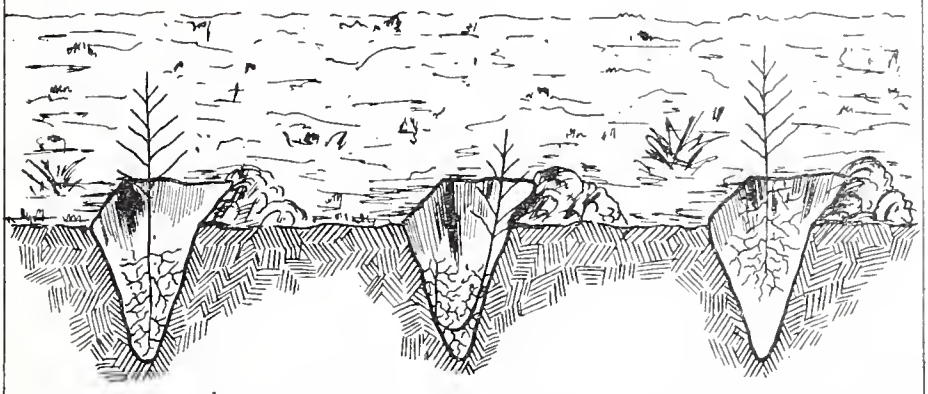
The trees should be planted in rows about 6 feet apart and spaced from 3 to 5 feet apart in the rows. This will give room enough for development and cultivation, and in normal years will not leave the trees too far apart if there are some losses.

## PROTECTION OF THE PLANTATIONS.

To prevent the destruction of the plantations by prairie fires, a double firebreak should be plowed around the trees. If the trees are included within the firebreak plowed for the protection of the home property, an extra break is unnecessary.

FIG. 2

## CORRECT AND INCORRECT METHODS OF PLANTING



GOOD PLANTING

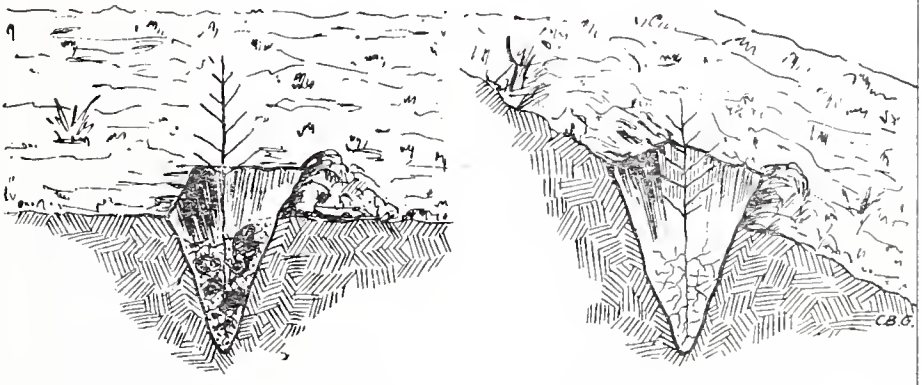
The tree will live if firmly set.

CARELESS PLANTING

The tree set too deep and the roots crowded will very likely die.

VERY CARELESS PLANTING

The tree if set too shallow will surely die.




CARELESS PLANTING

Sod, grass, or dry sand tamped around roots will dry the roots, and the tree will die.

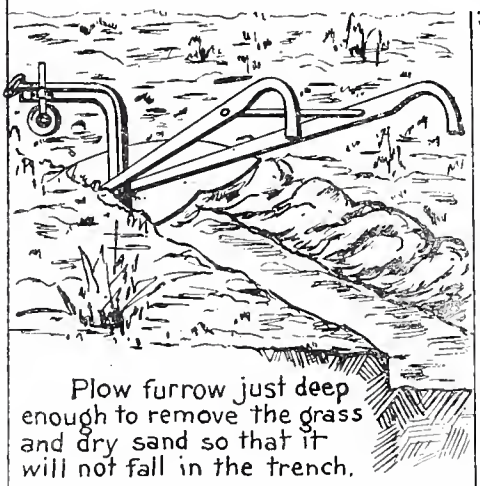
CARELESS PLANTING

The tree if set too deep on a hillside will be covered by soil rolling from above.

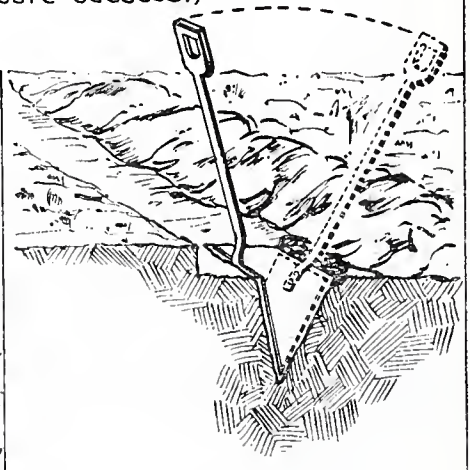
FIG. 3

## FIRST STEPS IN PLANTING

(Plant hardwoods on prepared ground and cultivate during first two years to insure success.)



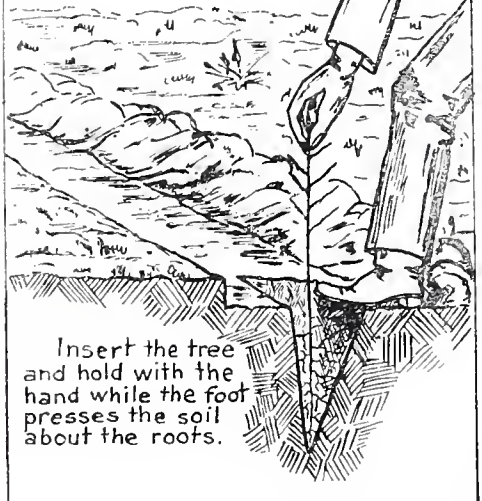
Plow furrow just deep enough to remove the grass and dry sand so that it will not fall in the trench.



Open a slit in the furrow with a spade.

FIG. 4

## SUCCESSIVE STEPS IN PLANTING



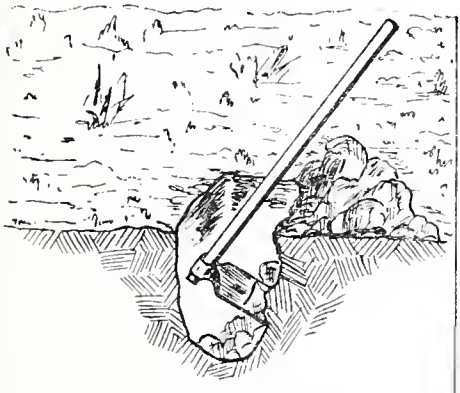
Insert the tree and hold with the hand while the foot presses the soil about the roots.

Close the entire hole by a thrust of the heel.

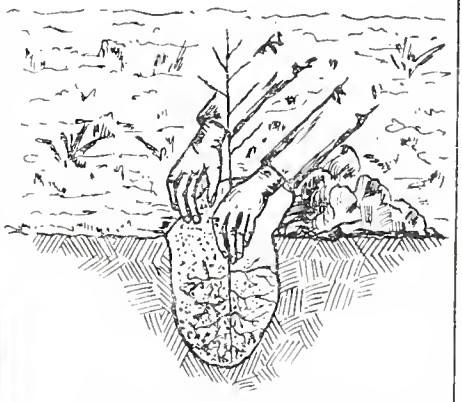
FIG. 5

## DEEP HOLE METHOD OF PLANTING

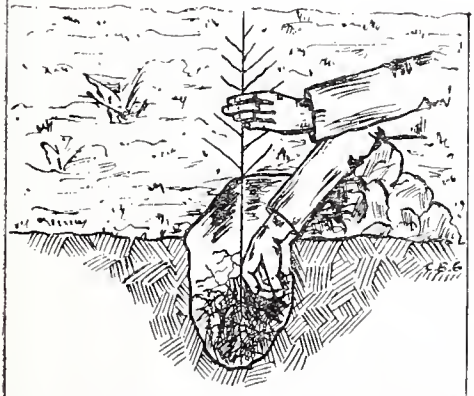
(This method should be used only when hardwoods are to be planted.)



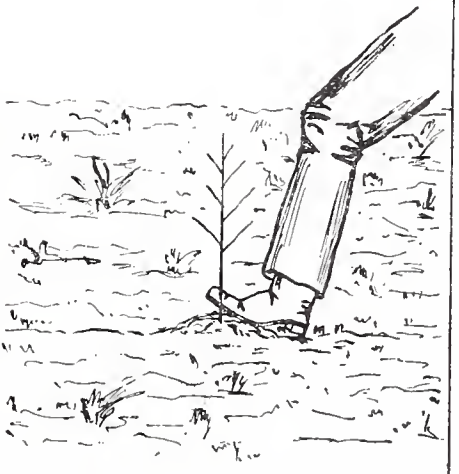
Digging the hole



Partially cover the roots with loose moist earth.



Tamp the dirt firmly about the roots before filling the hole.



After filling the hole press the soil firmly about the roots by a thrust of the heel.

A fenee should be constructed to keep out cattle, horses, and other stoek. This is a most important point, sinee stoek are likely to trample or eat the young trees. Most plantations can not be grazed for several years after planting.

Gophers probably destroy more trees than any other agent in western Nebraska. The young trees are often eovered by the mounds thrown out by the gophers, and they will gnaw off the roots of trees up to 6 feet or more in height. When fresh gopher mounds are discovered among the trees, it is neeessary to take aetion at once with traps or poison. Several good gopher traps are on the market, and this is the surest method of exterminating these rodents.

Potatoes, earrots, or parsnips eut up into small pieces and sprinkled with powdered stryehnine make a good poison bait. A small quantity of saeeharine or oil of anise should also be added to disguise the bitter taste of the stryehnine. The runways, whieh are usually 4 to 8 inches beneath the surfaee, can be loeated with an iron rod or probe. When found, drop one or two baits into the hole without disturbing the soil any more than is neeessary.

## HOW TO SECURE TREES.

A form of "applieation and agreement" may be seeured from the forest supervisor at Halsey, Nebr., and before any trees are distributed this applieation must be properly filled out and signed. Upon the receipt of the signed agreement the supervisor will distribute the trees in proportion to the number of applications and the amount of nursery stoek which is available. A sample form of the agreement follows:

Form 490.

APPLICATION AND AGREEMENT FOR YOUNG TREES, NEBRASKA NATIONAL FOREST.

I, ————, a resident of that portion of Nebraska lying within the boundaries described in the act of April 28, 1904 (33 Stat., 547), entitled "An act to amend the homestead laws as to certain unappropriated and unreserved lands in Nebraska," under the provisions of the act of March 4, 1911 (36 Stat., 1235), entitled "An act making appropriations for the Department of Agriculture for the fiscal year ending June thirtieth, nineteen hundred and twelve," do apply for young trees for planting within the area above referred to.

The ground on which I desire to plant trees comprises an area of —— acres, and is described as follows: Section ——, township ——, range ——.

Aspect: (Faces north, south, east, or west, or is it flat?) .....

Slope: (Steep or gentle?) .....

Grass and sod: (Heavy or light?) .....

Soil: (Loam, sandy loam, or sand?) .....

Cultivation: If hardwoods are desired, have you cultivated the ground on which to plant them? .....

The purpose of this planting is (shade, windbreak, or woodlot?) .....

In consideration of the granting of this application I promise and agree to plant all trees received by me and to care for them in the manner described in a circular of the Forest Service, Department of Agriculture, entitled "Tree Distribution Under the

Kinkaid Act, 1911," and in accordance with any later instructions received by me from the Forest Service. I further promise to mail to the forest supervisor, Halsey, Nebr., on a card, Form No. 491, prepared for this purpose, not later than November 1 of each year, for three years after the date of the latest planting done by me, a statement showing the number of trees of each year's planting which are surviving in the area I have planted and the number of trees which I desire to plant during the following season. And I also agree to permit any representative of the Department of Agriculture to enter my premises at any reasonable time for the purpose of investigating the condition of the trees planted by me and the care which they have been given.

I further agree, immediately upon receipt of notice of shipment of any trees sent to me, to take them without delay from the post office or express or railroad company transporting them, and to pay all of the costs of their transportation, or to send stamps prior to March 1 of each year, for their shipment by parcel post. If any package of trees is received by me in bad condition as a result of carelessness or long period in transit, I agree to accept the same without protest and immediately to notify the forest supervisor, Halsey, Nebr.

It is further agreed that if the trees received by me at any time are not planted, or are sold or otherwise disposed of, I am to forfeit the right to receive any more trees under the provisions of the act of March 4, 1911, herein referred to.

(Signed) .....

Date ..... Post office .....
Nearest express office .....

New applicants will be supplied with not to exceed 200 trees, depending on the number available at the nursery. Those who have made good use of their trees may, under certain conditions, receive up to 500 trees. Those desiring more than this number must secure them elsewhere, since it was not the intent of the act to have the Government furnish trees in large quantities to any one individual.

A detailed report on the method of planting and the conditions under which planting was done should be made on a record card which will be sent to the applicant when the trees are shipped. This card, the form of which is here given, is to be mailed to the forest supervisor, Halsey, Nebr., as soon as planting has been done.

Form 492.

REPORT ON PLANTING.

SPRING, 19—.

1. Date trees were received .....
2. Condition of trees when received .....
3. Species and number of each .....
4. If hardwoods were received, were they planted in prepared ground? .....
5. If so, how was ground prepared? .....
6. Were pines planted in furrows or unprepared ground? .....
7. Weather at time of planting .....
8. Method of planting .....
9. Date of planting .....
10. Has a fire guard been established? .....
11. Has a stock guard been built? .....
12. Remarks.....

This card should be mailed to the forest supervisor as soon after planting as possible, and in any event not later than May 1.

The agreement provides that the planter shall report annually for three years the number of trees surviving of each year's planting, and the form of card given herewith has been prepared for this purpose. This card should be filled out early in the fall after the trees are planted and returned to the supervisor.

Form 491 (Revised). Return card.

FALL REPORT OF KINKAID PLANTING.

Date of this report, ....., 19—.

| Number of trees living this fall from those planted— | | | Total living from last three seasons' planting. |
|---|---|---|---|
| Year before last. | Last year. | This year. | |
| | | | |

Do you wish trees next spring? .....

Remarks: .....

Sign here .....

Address .....

## GENERAL INSTRUCTIONS.

1. Applications for trees should be mailed to the forest supervisor, Halsey, Nebr., before March 1 of each year.

2. Form 492 should be mailed before May 1.

3. Form 491 should be mailed before November 1.

4. Mark the plantations of each year by setting stakes and marking them plainly "1915," "1916," etc., so that each year's planting may be identified.

5. Success in tree planting, like success in everything else, depends upon the care given to it. Do not allow the roots of the trees to become dry. Protect the trees from fire, stock, and gophers. Cultivate all hardwoods. Officers of the Forest Service will do all in their power to assist by advice and suggestions, but it must be borne in mind that constant care and attention on the part of the planter are necessary to success in tree planting, especially in the dry, sandy soils of the Kinkaid district.

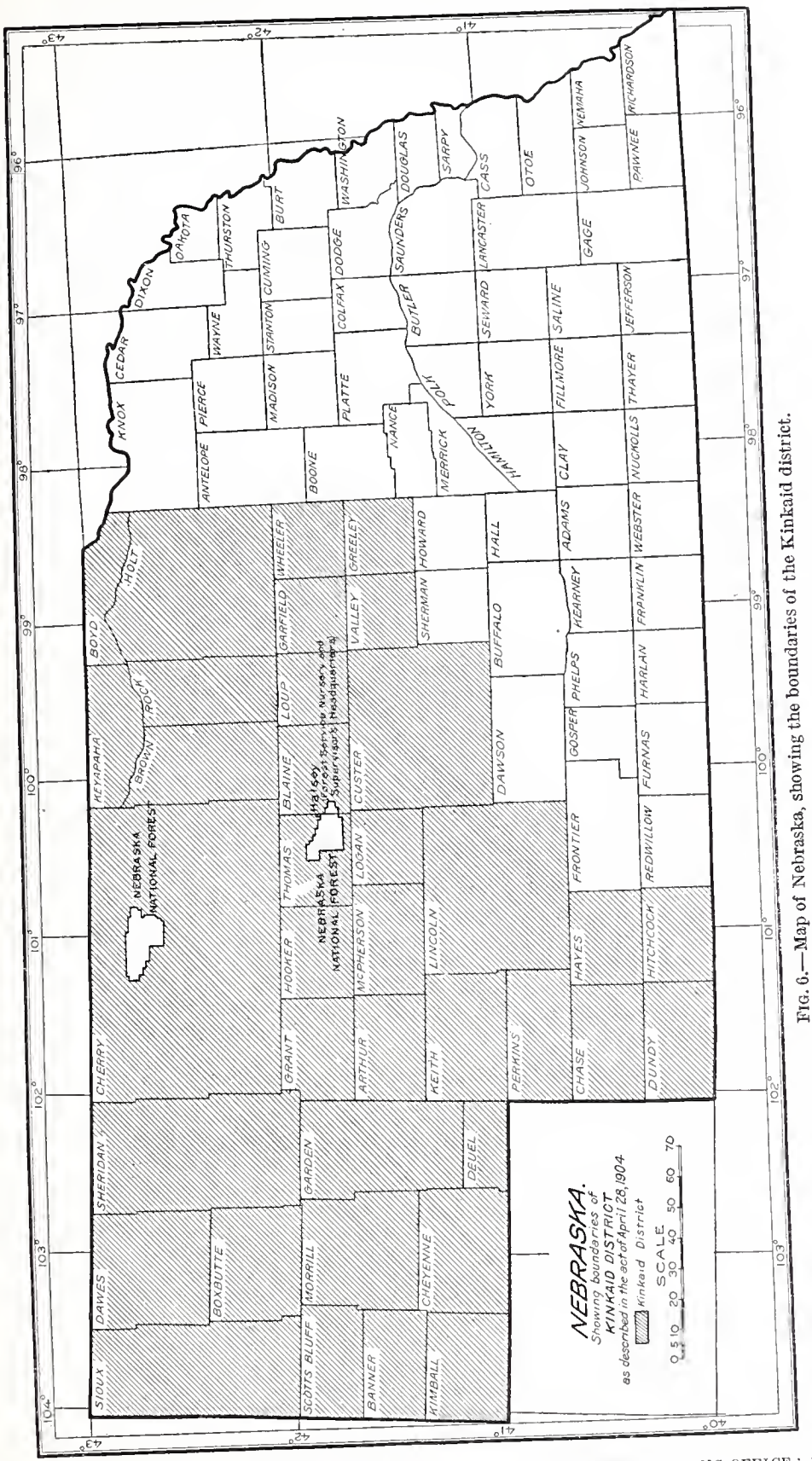



FIG. 6.—Map of Nebraska, showing the boundaries of the Kinkaid district.

WASHINGTON : GOVERNMENT PRINTING OFFICE : 1916